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Sorensen

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(54) **HEADSET WITH TURNABLE EAR HOOK WITH TWO OFF POSITIONS**

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(52) **U.S. Cl.**

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(58) **Field of Classification Search**

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USPC 381/381

See application file for complete search history.

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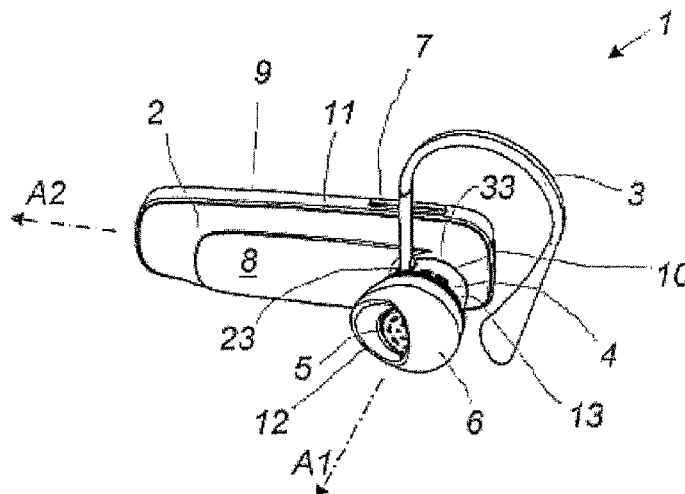
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(57) **ABSTRACT**

A headset (1) comprising a switch (15; 19) and an actuating member (13), which is turnable in relation to the housing (2) about a first axis (A1). An ear hook (3; 32) is attached to the actuating member (13). The ear hook (3; 32) can be arranged in a right ear mode for wearing the headset (1) at the right ear and a left ear mode for wearing the headset at the left ear. The switch (15; 19) switches the headset electronics from an active state to a passive state, when the ear hook (3) is turned about the first axis (A1) in a first direction (P1) from an active position to a first passive position. The switch (15; 19) switches the headset electronics from the active state to the passive state when the ear hook (3) is turned about the first axis (A1) in the second direction (P2) from the active position to a second passive position.

13 Claims, 3 Drawing Sheets



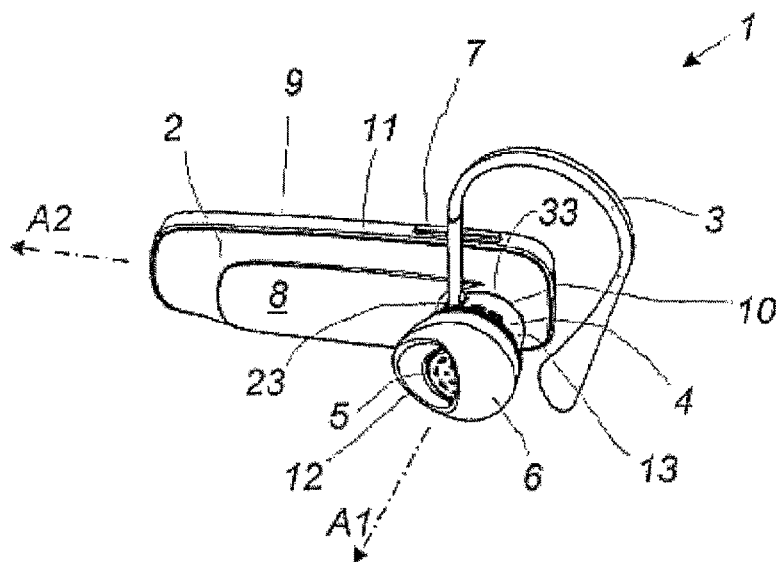


Fig. 1

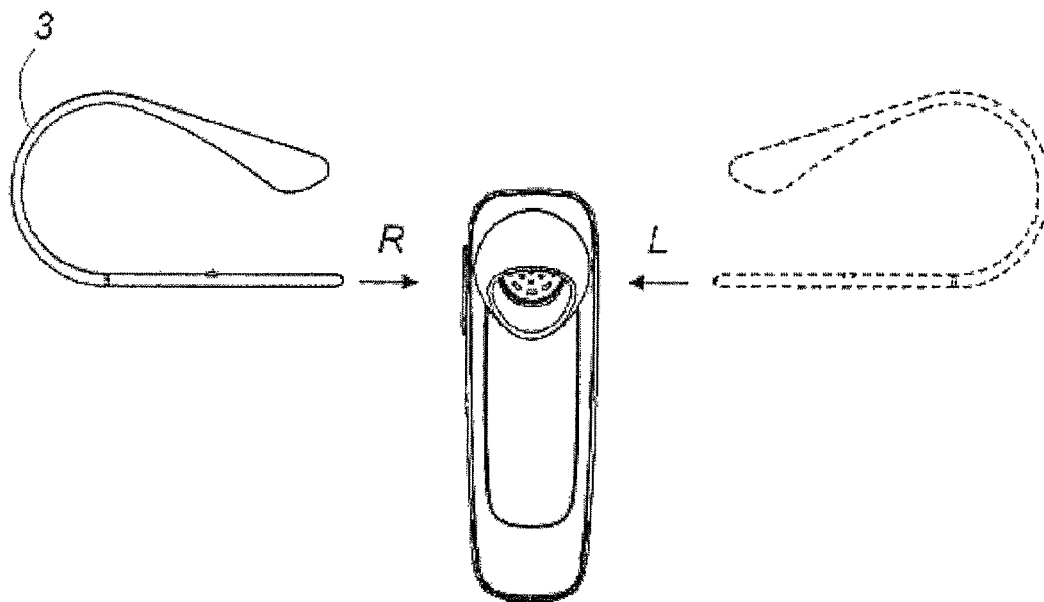


Fig. 2

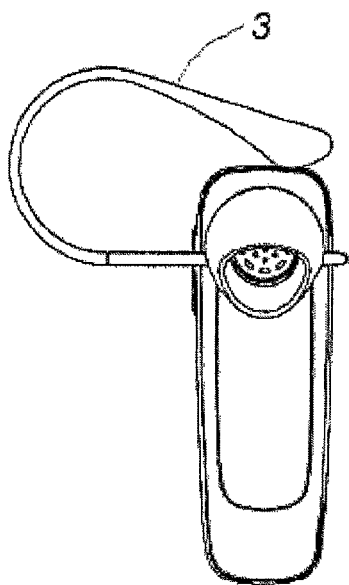


Fig. 3

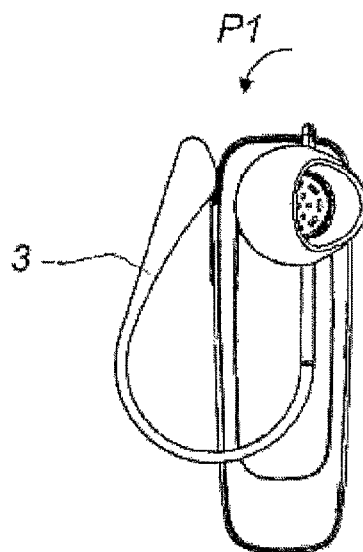


Fig. 4

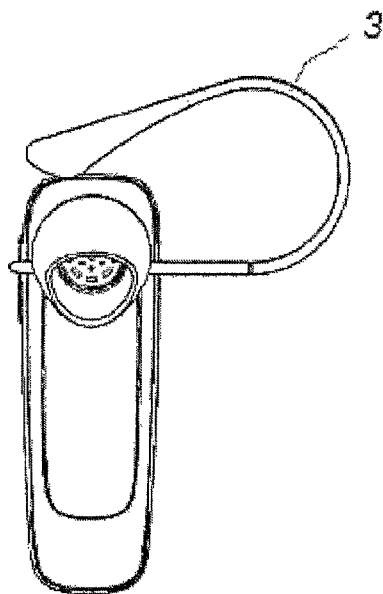


Fig. 5

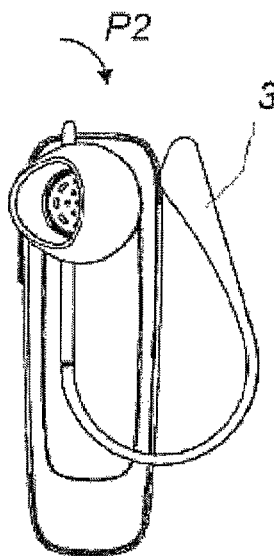


Fig. 6

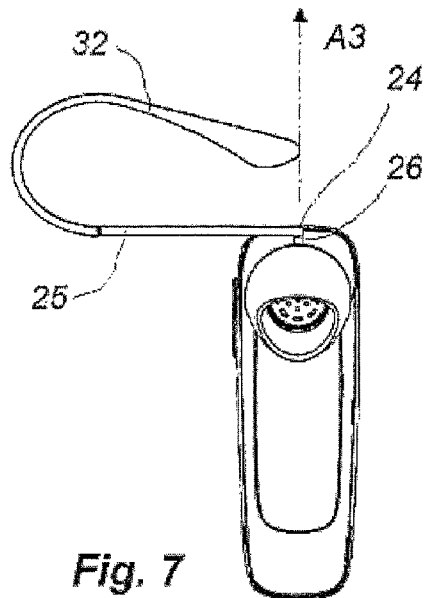


Fig. 7

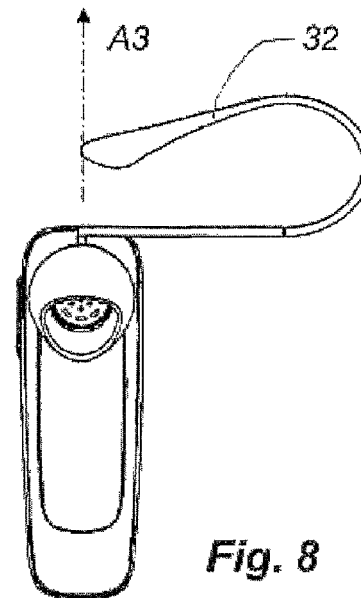


Fig. 8

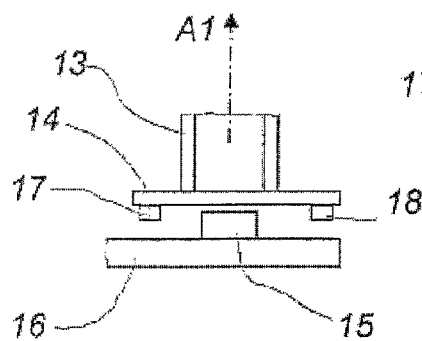


Fig. 9

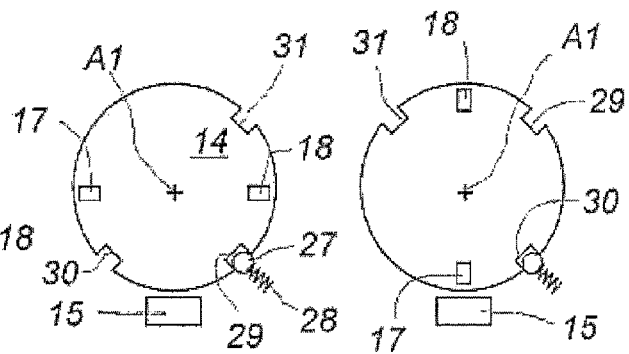


Fig. 10

Fig. 11

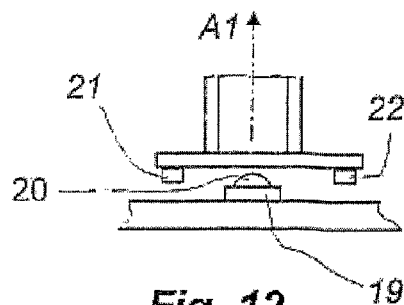


Fig. 12

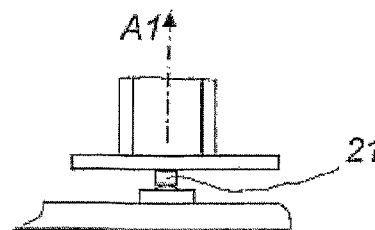


Fig. 13

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HEADSET WITH TURNABLE EAR HOOK WITH TWO OFF POSITIONS

TECHNICAL FIELD

The invention relates to
a headset comprising a housing with headset electronics
and an ear hook for attaching the headset to a users ear,
wherein
the headset comprises a switch,
an actuating member, which is turnable in relation to the
housing about a first axis,
the ear hook is attached to the actuating member,
the ear hook can be arranged in a right ear mode for wear-
ing the headset at the right ear and a left ear mode for
wearing the headset at the left ear, and wherein
the switch switches the headset electronics from an active
state to a passive state, when the actuating member is
turned about the first axis in a first direction from an
active position to a first passive position and from the
passive state to the active state, when turned in a second
opposite direction from the first passive position to the
active position.

BACKGROUND ART

Communication headsets are becoming more and more
widely used. Especially, small Bluetooth headsets to be used
with cellular phones have become increasingly popular the
recent years.

A modern headset is a small compact unit with small oper-
ating buttons on the surface. In order to change mode of the
headset, e.g. switching the headset on/off or answering a
telephone call, the user typically presses a small momentary
button. As the headset is a small unit, the button is often very
small and it can be cumbersome to press it correctly. Thus, it
is desirable to provide switching function of a headset without
this disadvantage.

U.S. Pat. No. 7,046,799 discloses a headset with a pivotally
mounted ear hook and an activation switch that activates the
headset when the ear hook is in an open position and deacti-
vates the headset when the ear hook is in a closed position.

WO 2008/145127 discloses a headset with a turnable
speaker tower wherein the headset can be switched on and off
by turning the speaker tower about an axis. According to an
embodiment, an ear hook can be attached to the speaker
tower. When the ear hook is arranged for right ear use, the ear
hook is turned into a compact position, when the headset is
switched off. This is very advantageous, as the headset takes
up less space. Furthermore, the risk of unintended switching
“on” is small, as it requires that the ear hook must be turned
into an active and less compact position. However, when the
ear hook is arranged for left ear use, the ear hook is not turned
into a compact position when the headset is switched off.
Thus, the ear hook points away from the headset housing,
which is disadvantageous, if the user wants to keep the head-
set in his pocket or the like. Furthermore, the risk of unin-
tended switching “on” can be higher when the ear hook is not
kept in a compact position.

DISCLOSURE OF INVENTION

An object of the invention is to provide a headset with
improved switching functionality for both left ear use and
right ear use.

According to the invention the object is obtained by a
headset according to the preamble which is characterized in

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that the switch switches the headset electronics from the
active state to the passive state when the actuating member is
turned about the first axis in the second direction from the
active position to a second passive position and from the
passive state to the active state when turned in the first direc-
tion from the second passive position to the active position.
With such a headset, the headset electronics can be switched
to a passive state by turning the ear hook into a passive and
more compact position, irrespective of the ear hook being
arranged in right ear mode or left ear mode.

According to an embodiment, the housing comprises an
inner side facing the user's ear during use and an outer side
facing away from the user's ear during use, wherein the
headset further comprises a speaker tower extending from the
inner side along the first axis.

The actuating member may be a turnable part of the
speaker tower. This turnable part is preferably a distal part of
the speaker tower. Such a construction is relatively easy to
implement.

Preferably, the ear hook is detachably attached to the actu-
ating member. This may be advantageous, as the user in
certain cases may prefer to use the headset without the ear
hook, e.g. by attaching the headset by inserting an earbud in
the ear.

According to a preferred embodiment, the actuating mem-
ber comprises a through going mounting hole to which the ear
hook can be inserted from one end for right ear mode and the
other end for left ear mode. This is a particularly simple way
of implementing the possibility of changing the ear hook
from right ear mode to left ear mode and vice versa.

According to an alternative embodiment, the ear hook
comprises an ear engaging part and a headset engaging part,
which are interconnected by an ear hook hinge, such that the
ear engaging part can rotate about a third axis in relation to the
headset engaging part. With such a solution it is not necessary
to detach the ear hook in order to change from right ear mode
to left ear mode and vice versa.

The first axis and the third axis can be essentially perpen-
dicular.

According to an embodiment, the turning angle between
the active position and any of the first and second passive
positions is between 45 and 135 degrees, preferably between
60 and 120 degrees, more preferably between 75 and 115
degrees, even more preferably between 80 and 100 degrees,
most preferably between 85 and 85 degrees, e.g. essentially
90 degrees. A turning angle of a certain size is preferred in
order to obtain a movement from an active position to a
passive, more compact position and in order to better distin-
guish active mode from passive mode by just looking at the
headset.

Preferably, the headset comprises a detent mechanism for
releasably holding the actuating member in the active posi-
tion, the first passive position and the second passive position.
In this way, a more reliable functioning is obtained.

According to particularly preferred embodiment, the head-
set electronics are in the passive state, when the actuating
member is in the first and second passive positions and in
active state, when the actuating member is in the active posi-
tion and any intermediate position between the active position
and the first and second passive positions. Hereby, the risk of
unintended switching from active mode to passive mode, e.g.
during a phone call, is minimized, as the ear hook must be
turned completely to one of the passive positions in order to
switch to passive mode.

According to a specific embodiment, the switch comprises
a proximity sensor, which is fixed in relation to the housing
and where the actuating member comprises a first sensor

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target, which is sensed by the proximity sensor, when the actuating member is in the first passive position, and a second sensor target, which is sensed by the proximity sensor, when the actuating member is in the second passive position. The proximity switch may be a Hall Effect switch.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is explained in detail below with reference to the drawing illustrating a preferred embodiment of the invention and in which

FIG. 1 is a perspective view of a first embodiment of a headset according to the invention,

FIG. 2 is a bottom view of the headset according to the first embodiment with indications of how to arrange the ear hook for right ear use and left ear use, respectively,

FIG. 3 is a bottom view of the headset according to the first embodiment where the ear hook is arranged for right ear use and in an active position,

FIG. 4 is a bottom view of the headset according to the first embodiment where the ear hook is arranged for right ear use and in the passive position,

FIG. 5 is a bottom view of the headset according to the first embodiment seen where the ear hook is arranged for left ear use and in the active position,

FIG. 6 is a bottom view of the headset according to the first embodiment where the ear hook is arranged for left ear use and in the passive position,

FIG. 7 is a bottom view of a headset according to a second embodiment where the ear hook is arranged for right ear use and in the active position,

FIG. 8 is a bottom view of the headset according to the second embodiment where the ear hook is arranged for left ear use and in the active position,

FIG. 9 is a schematic side view of a first embodiment of the headset comprising the switching mechanism in the active position,

FIG. 10 is a schematic top view of the same switching mechanism in the active position,

FIG. 11 is a schematic top view of the same switching mechanism in one of the passive positions,

FIG. 12 is a schematic side view of an alternative embodiment of the switching mechanism in the active position, and

FIG. 13 is a schematic side view of the switching mechanism shown in FIG. 12 in one of the passive positions.

MODES FOR CARRYING OUT THE INVENTION

FIG. 1 discloses a headset 1 according to a first embodiment of the invention. The headset 1 is a wireless headset following the Bluetooth standard and is inter alia intended for use with cell phones. The headset 1 comprises a headset housing 2, which encloses the major part of the headset electronics, such as printed circuit board, Bluetooth transceiver chip, battery, audio processing electronics etc. The housing 2 has a first housing side 8 facing the users head during use and a second opposite housing side 9 facing away from the users head during use. A peripheral wall 11 connects the first housing side 8 and the second housing side 9. A so-called speaker tower 4 projects from the first housing side 8 along a first axis A1 and comprises a speaker with a speaker front 5. The housing 2 extends along a second axis A2. The angle between the first axis A1 and the second axis A2 is approximately 80-90°. An ear bud 6 of soft material with a sound opening 12 is arranged on the distal end of the speaker tower 4 and is adapted for inserting into the lower concha of the users ear. An ear hook 3 is detachably inserted in a through going, trans-

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versal hole 23 in the speaker tower 4. A non-visible microphone is arranged at left-most end of the housing 2 in FIG. 1.

The speaker tower 4 is divided by a narrow slot 10 into a fixed part 33 and a turnable part 13. The turnable part 13 is turnable about the first axis A1.

FIG. 2 illustrates how the ear hook 3 can be arranged for right ear use and left ear use. The full line illustration of the ear hook 3 and arrow R show in which direction the ear hook 3 must be inserted into the transversal hole 23 in the speaker tower 4, when the user wants the wear the headset 1 on the right ear. The phantom lines in FIG. 2 and the arrow L illustrate how to insert the ear hook when the headset 1 is to be worn on the left ear.

The turnable part 13 of the speaker tower 4 can be rotated into three fixed positions, namely one active position and two passive positions.

In FIG. 3, the ear hook 3 is arranged for right ear use, and the turnable part 13 of the speaker tower 4 and the ear hook 3 is turned into the active position, where the headset 1 is switched on.

In FIG. 4, the turnable part 13 and the ear hook 3 is turned approximately 90 degrees in the direction of the arrow P1 to the first passive position, where the headset 1 is switched off.

In FIG. 5, the ear hook 3 is arranged for left ear use, and the turnable part 13 of the speaker tower 4 and the ear hook 3 is turned into the active position, where the headset 1 is switched on.

In FIG. 6, the turnable part 13 and the ear hook 3 is turned approximately 90 degrees in the direction of the arrow P2 to the second passive position, where the headset 1 is switched off.

FIGS. 7 and 8 disclose a second embodiment of headset according to the invention. In this embodiment, the ear hook 32 is divided into an ear engaging part 25 and a headset engaging part 26. These two parts are interconnected by an ear hook hinge 24, such that the ear engaging part 25 is turnable approximately 180 degrees about a third axis A3 in order to change the ear hook between right ear use and left ear use. FIG. 7 shows the headset 1 with the ear hook 32 arranged for right ear use, and FIG. 8 shows the headset 1 with the ear hook 32 arranged for left ear use.

FIG. 9 is a schematic side view of a portion of the headset comprising the switching mechanism. Only the most necessary parts are shown in order to explain how the switch mechanism works. The turnable part 13 of the speaker tower is at the bottom connected to a disc 14, which turns with the turnable part 13. A first magnet 17 and a second magnet 18 is attached to the under side of the turnable click 14. A printed circuit board 16 comprises a Hall Effect switch 15, which is placed close to the turnable disc 14. FIG. 9 shows the active position of the ear hook 3; 32.

FIGS. 10 and 11 are schematic top views of the turnable disc 14, the first and second magnets 17, 18 and the Hall Effect switch 15. When the ear hook 3; 32 is in the active position, as shown in FIG. 10, the first and the second magnets 17, 18 are spaced apart from the Hall Effect switch 15. When the ear hook 3; 32, the turnable part 13 and the turnable disc 14 is turned into the first passive position, the first magnet 17 is turned in to close proximity of the Hall Effect switch 15, which switches the headset electronics off. This is shown in FIG. 11. Likewise, if the hook 3; 32, the turnable part 13 and the turnable disc 14 is turned into the second passive position, the second magnet 18 is turned in to close proximity of the Hall Effect switch 15, which also switches the headset electronics off.

A ball 29, a spring 28 and three recesses 29, 30 and 31 provides a detent mechanism for releasably holding the ear

hook 3, 32 in the active position, the first passive position and the second passive position. Thus, the spring-biased ball 27 engages the first recess 29 for holding the ear hook 3, 32 in the active position, while the ball 27 engages the second recess 30, when the ear hook 3, 32 is in the first passive position and the third recess 31 when the ear hook 3, 32 is in the second passive position. A certain turning force is needed to turn the ear hook 3, 32 out of these three positions.

FIGS. 12 and 13 disclose an alternative embodiment of the switching mechanism. Here, the Hall Effect switch 15 is replaced by a micro switch 19 with a mechanical actuator 20, and the first and second magnets 17, 18 are replaced by first and second protrusions 21, 22. When the ear hook 3, 32, the turnable part 13 and the turnable disc 14 is turned into the first passive position, the first protrusion 21 presses the switch actuator 20 of the micro switch 19 down, which switches the headset electronics off. This is shown in FIG. 12. Likewise, when the ear hook 3, 32, the turnable part 13 and the turnable disc 14 is turned into the second passive position, the second protrusion 22 presses the switch actuator 20 of the micro switch 19 down, which switches the headset electronics off. This is shown in FIG. 13.

In the embodiments shown in FIGS. 9-13, the headset is switched on, until the ear hook 3, 32, the turnable part 13 of the speaker tower 4 and the disc 14 reaches the first or the second passive positions. Thus, the headset 1 is not accidentally switched off if the user unintended moves the ear hook 3, 32 out of the active position. In fact, the user must turn the ear hook 3, 32 approximately 90 degrees in either direction away from the active position to switch the headset off.

In the disclosed embodiments, the ear hook 3, 32 is used to switch the headset on and off. The "off" condition can be a condition where the headset uses no power at all, or I could be a sleep or standby mode, where only a little power is consumed.

The turning movement of the ear hook 2, 32 could also be used for answering and end phone calls. Thus, If the ear hook 2, 32 is in one of the passive positions and the phone rings, the user can answer the call by turning the ear hook 3, 32 to the active position and end the call by turning the ear hook 3, 32 to the passive position. It is also possible to combine the switching on/off function with the accept/end call function. Thus, if the headset 1 is switched off while the phone rings, the user can switch the headset 1 on and, simultaneously, accept the call by turning the ear hook 2, 32 from the passive to the active position.

Different materials can be used for the headset 1. Preferably, plastics are used to manufacture the housing 2. The ear hook 2, 32 can be made of plastics or metal, e.g. spring steel and it can be manufactured from more than one material, such as rubber-coated metal. The ear gel 6 is preferably made from rubber, silicone or other soft material.

The headset according to the invention is not necessarily a wireless headset. It could also be corded.

The speaker can be arranged in the turnable 13 part of the speaker tower 4 or in the housing 2.

The turnable actuating member does not necessarily have to be a part 13 of the speaker tower 4. It could be part which is turnable attached to the housing 2 at another area, e.g. beside the speaker tower 4.

Turning angles may be different for left and right ear mode due asymmetric position of axis of the turnable part.

Other switches than those disclosed here may be used. The switch could also be arranged in the turnable part.

Reference signs used in the figures and the detailed description:

1	headset
2	headset housing
3	ear hook
4	speaker tower
5	speaker front
6	ear bud
7	multi function button
8	inner side of headset housing
9	outer side of headset housing
10	slot between speaker tower and housing
11	peripheral wall of housing
12	sound opening
13	turnable part of speaker tower
14	turnable disc
15	Hall Effect switch
16	printed circuit board
17	first magnet
18	second magnet
19	push button switch
20	actuator
21	first protrusion
22	second protrusion
23	mounting hole
24	ear hook hinge
25	ear engaging part of ear hook
26	headset engaging part of ear hook
27	ball
28	spring
29, 30, 31	recesses
32	ear hook
33	fixed part of speaker tower
A1	first axis
A2	second axis
A3	third axis
P1	first direction
P2	second direction
R	insertion direction
L	insertion direction

The invention claimed is:

1. A headset comprising a housing with headset electronics and an ear hook for attaching the headset to a users ear, and for switching the headset from an active, power on state, to a passive, standby or power off state, wherein the headset comprises a switch, an actuating member, which is turnable in relation to the housing about a first axis, the ear hook is attached to the actuating member, the ear hook can be arranged in a right ear mode for wearing the headset at the right ear and a left ear mode for wearing the headset at the left ear, wherein the passive state has the ear hook and the housing are substantially overlapping in a compact storage position, and the active state has the ear hook rotated generally orthogonal to the housing, in a user wearable position, the switch switches the headset electronics from an active state to a passive state, when the actuating member is turned about the first axis in a first direction from an active position to a first passive position and from the passive state to the active state, when turned in a second opposite direction from the first passive position to the active position, wherein the switch switches the headset electronics from the active state to the passive state when the actuating member is turned about the first axis in the second direction from the active position to a second passive position and from the second passive state to the active state when turned in the first direction from the second passive position to the active position,

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wherein the housing comprises an inner side facing the user's ear during use and an outer side facing away from the user's ear during use, and the headset further comprises a speaker tower extending from the inner side along the first axis, and

wherein the actuating member constitutes a turnable part of the speaker tower.

2. A headset according to claim 1, wherein the turnable part of the speaker tower is a distal part of the speaker tower.

3. A headset according to claim 1, wherein the ear hook is detachably attached to the actuating member.

4. A headset according to claim 3, wherein the actuating member comprises a through going mounting hole to which the ear hook can be inserted from one end for right ear mode and the other end for left ear mode.

5. A headset according to claim 1, wherein the ear hook comprises an ear engaging part and a headset engaging part, which are interconnected by an ear hook hinge, such that the ear engaging part can rotate about a third axis in relation to the headset engaging part.

6. A headset according to claim 5, wherein the first axis and the third axis are essentially perpendicular.

7. A headset according to claim 1, wherein the turning angle between the active position and any of the first and second passive positions is between 45 and 135 degrees.

8. A headset according to claim 1, wherein the headset comprises a detent mechanism for releasably holding the actuating member in the active position, the first passive position and the second passive position.

9. A headset according to claim 8, wherein the headset electronics are in the passive state, when the actuating member is in the first and second passive positions and in active state, when the actuating member is in the active position and any intermediate position between the active position and the first and second passive positions.

10. A headset according to claim 1 wherein the switch comprises a proximity sensor, which is fixed in relation to the housing and where the actuating member comprises a first sensor target, which is sensed by the proximity sensor, when the actuating member is in the first passive position, and a second sensor target, which is sensed by the proximity sensor, when the actuating member is in the second passive position.

11. A headset according to claim 10, wherein the proximity switch is a Hall Effect switch.

12. A headset comprising a housing with headset electronics, a rotatable speaker tower, and an ear hook attached to the speaker tower for attaching the headset to a users ear, and for rotatably switching the headset from an active, power on state, to a passive, standby or power off state wherein

the headset comprises a rotatable switch, having a disk with position detents located to correspond to power on and off states of rotation;

an actuating member, which is turnable in relation to the housing about a first axis,

the ear hook is attached to the actuating member, the ear hook can be arranged in a right ear mode for wearing the headset at the right ear and a left ear mode for wearing the headset at the left ear,

wherein the passive state has the ear hook and the housing are substantially overlapping in a compact storage position, and the active state has the ear hook rotated generally orthogonal to the housing, in a user wearable position,

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the switch switches the headset electronics from an active state to a passive state, when the actuating member is turned about the first axis in a first direction from an active position to a first passive position and from the passive state to the active state, when turned in a second opposite direction from the first passive position to the active position, wherein

the switch switches the headset electronics from the active state to the passive state when the actuating member is turned about the first axis in the second direction from the active position to a second passive position and from the second passive state to the active state when turned in the first direction from the second passive position to the active position,

wherein the housing comprises an inner side facing the user's ear during use and an outer side facing away from the user's ear during use, and wherein the speaker tower extends from the inner side along the first axis, and

wherein the actuating member constitutes a turnable part of the speaker tower.

13. A headset comprising a housing with headset electronics, a rotatable speaker tower, and an ear hook attached to the speaker tower for attaching the headset to a users ear, and for rotatably switching the headset from an active, power on state, and two a passive, standby or power off states which are 90 degrees off the active position wherein

the headset comprises a rotatable switch, having a disk with position detents located to correspond to power on and off states of rotation;

an actuating member, which is turnable in relation to the housing about a first axis,

the ear hook is attached to the actuating member,

the ear hook can be arranged in a right ear mode for wearing the headset at the right ear and a left ear mode for wearing the headset at the left ear,

wherein the passive state has the ear hook and the housing are substantially overlapping in a compact storage position, and the active state has the ear hook rotated generally orthogonal to the housing, in a user wearable position,

the switch switches the headset electronics from an active state to a passive state, when the actuating member is turned about the first axis in a first direction from an active position to a first passive position and from the passive state to the active state, when turned in a second opposite direction from the first passive position to the active position, wherein

the switch switches the headset electronics from the active state to the passive state when the actuating member is turned about the first axis in the second direction from the active position to a second passive position and from the second passive state to the active state when turned in the first direction from the second passive position to the active position,

wherein the housing comprises an inner side facing the user's ear during use and an outer side facing away from the user's ear during use, and wherein the speaker tower extends from the inner side along the first axis, and

wherein the actuating member constitutes a turnable part of the speaker tower.

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